CHAPTER 3: INTRODUCTION TO DATABASE MANAGEMENT SYSTEM (DBMS)

I. DEFINITION OF TERMS

• **DATA**- raw or unprocessed facts you record

• **INFORMATION** - processed data to make a meaningful context

• **DATABASE** - collection of related data. Ex. Online banking system and library management system

• **META-DATA** - database definition which defines the database. Information like storage format , data type , constraints on data.

• **DATABASE MANAGEMENT SYSTEM** - a system or collection of programs that enables users to create and maintain the database

II. FUNCTIONALITIES - Allows users to:

1. **Define** - specifying the data type , structures and constraints (limits on the data) for the data to be stored.

2. **Construct** - process of storing data on some storage medium.

3. **Manipulate** - querying the database to retrieve specific database, updating database and generating reports.

4. **Share** - allows multiple users and programs to access the database concurrently (at the same time efficiently).

5. **Protection** of databases from unauthorized access , from hardware and software failures , and maintenance of database for long period of time.

III. PROPERTIES

1. A database represent some aspects of the real world (minimal world)

- objects , properties , relationships between them and change in real world

2. A database is a logically coherent collection of data with some inherent meaning

- unrelated data cannot refer as database

3. A database is designed , built and populated with data for a specific purpose

IV. DB SYSTEM ENVIRONMENT

• **Database System**

Users/Programmers - Application Programs/ Queries -

• **DBMS Software**

Software to process queries or programs - Software access store data

• And

Stored database definition (META-DATA) & Stored database

V. **EXAMPLE OF DBM (UNIVERSITY DATABASE)**

- a database that stores student and course information

Student

Name: Roll No: Class: Major:

Course

Course name: Course No.: Dept

VI. **FILE SYSTEM APPROACH VS DBMS**

• **file system approach** - data stores in file and there is redundancy or duplication of data while **DBMS** a single repository and multiple users can access database on their interests

VIII. CHARACTERISTICS

1. Self- describing nature of a database system

• **database system** = database + metadata - stored in: DBMs catalog - Used by: DBMS software and databases users

• DBMS software must work equally well with any numbers of database applications

• in traditional file processing , metadata is a part of application program which of work with only one specific database.

2. Insulation between programs and data and data abstraction

• in traditional file processing - structure of data files is embedded in the application programs

• in database approach - structure of data files is stored in the dbms category separate from access programs

• the characteristic that allows program data independence is called **data abstraction**

• dbms provide with conceptual representation of data which hides d behind the scene details or complicated that are non interest to users.

• **data model** - is a type of data abstraction that provides conceptual representation of data based users in a way that most users can understand

- hides storage implementation details from users

3. Support of multiple views of data

• a database as many users , each of whom may require different view of database.

• **View**- subset of database that contains a virtual data (not physically or explicitly stored) derived from database.

4. Storing of data and multi-user transaction processing

• multi-user dbms - allows multiple users to access the database at the same time so dbms must include concurrency control

• **concurrency control -** when multiple users are sharing the same database at the same time and it prevent two users from editing the same data at the same time.

• **OLTP (online transaction processing) -** major part of database application

• databases must enforce several transaction properties

1. **Isolation** - if one agent assign seat to a passenger, that's it is blocked from other agent

2. **Atomicity** - dbms ensure that transaction is executed completely or not at all

VIII. DATABASE USERS

A. Actors on the scene - people whose jobs involve using large database everyday.

1. **Database administrators** - database environment there's primary resource (database) and secondary (DBMS & related software)

- responsibilities:

a. Administering primary and secondary resources

b. Authorizing access to the database

c. Coordinating and monitoring use of database

d. Acquiring hardware and software resource as needed

e. Double shooting and see security issues

2. **Database designers** - responsible for:

a. Identifying the data to be stored in the database

b. Choosing appropriate structures to represent and store data

c. Communicating with database users to understand their requirements - design database

3. **End users** - people whose jobs require access to the database for querying , updating , generating reports

- categories:

a. **Casual end users** - access database occasionally and typically middle or high level managers or other occasional browsers

b. **Naive or parametric end users** - constantly querying and updating databases using canned transactions.

c. **Sophisticated end users** - engineers , scientists , business analysts , or any experts who are familiar with dbms.

d. **Standalone users**- maintains personal databases by using ready-made program packages like personal financial statement.

4. **System analysts and application programmers (software engineers)** - experts

• system analysts - determine the requirements of end users and develop specifications for canned transactions

• application programmers - test , the bad , document and maintain these canned transactions

B. **Workers behind the scene** - people whose work is to maintain the database system environment. Deals with design , development , operation and not interested on database itself.

1. **System designers and implementers** - design and implement dbms modules and interfaces as a package

2. **Tool developers** - persons who design and implement tools (software packages) to help improve performance of database system

3. **Operators and maintenance personnel-** responsible for actual running and maintenance of hardware and software

IX. ADVANTAGES AND DISADVANTAGES

A. ADVANTAGES

1. Controlling redundancy

• in traditional file system, each user group maintained its own files which will lead to wastage of storage space , inconsistency.

• in the database approach, views of different users are integrated or linked together while designing database. All data stored in only one place of the database and ensures consistency and save storage space.

2. **Restricting unauthorized access**

• when multiple users share a large database , the type of access operation must be controlled.

• DBMS must provide security and authorization subsystem used by dba to create accounts and specifies account restrictions

Ex. Parametric users allowed to access database only through canned transactions

3. **Providing persistent storage for program objects (object oriented)**

• in traditional file system, one program terminates and the values of program variables discarded. Must be explicitly stored in separate permanent files which involves conversion.

• DBMS - once program terminates , the values of program variables are not discarded which store subject permanently, such an object is said to be persistent. It recognizes data structures of programming language like java, c++ which automatically converts

4. **Providing storage structures for efficient query processing**

• database systems must provide capabilities for efficiently executing queries and updates

• since data base is stored on disk,, dbms must provide specialized data structures (indexes) to speed up disk search

* **Databases buffer -** allows the prairie storage of data in the main memory

* **Query processing and optimization module**- responsible for efficient query execution and choose how to process and execute queries efficiently

5. **Providing backup and recovery**

• **the backup and recovery subsystem** of dbms is responsible for recovery in case of hardware or software failures

Ex. If the computer crashes during a complex transaction , the recovery subsystem is responsible for ensuring the transaction resumes from where it is interrupted or at least restore to the state it was before transaction started executing

6. **Providing multiple user interfaces**

- multiple users have different levels of technical knowledge so dbms should provide a variety of user interfaces. Ex.

✓ Query languages - casual users

✓ programming language interface - application programmers

✓ forms- parametric users

✓ menu driven interface - standalone users

• **form-style interface and multi driven interfaces** - graphical user interface (GUIs)

7. **Representing complex relationship among data**

• databases may have a variety of data interelated in many ways

• dbms must capable:

- representing complex relationships among data

- retrieval update related data easily and efficiently

8. **Enhancing integrity constraints**

• simplest type of integrity constraint is the specifying data type for each data item

• another type is uniqueness of data item values

• responsibility of database designers is to identifying integrity constraints during latest design

9. **Permitting inferencing and action using rules**

• database system must provide capabilities for the finding deduction rules for interference in new information. Such system is called "deductive databases system"

• **active database systems** - provides active rules that automatically initiate actions when certain events and condition occurs

B. Additional implications of using database approach

1. **Potential for enforcing standards**

- DBA can define and enforce standards among database. This facilitates communication and cooperation within the organization.

2. **Reduce application development time**

- important feature of database approach is developing a new application takes every little time.

3. **Flexibility**

- modern dbms allows certain type of changes to the structure of database without affecting the stored data and existing application programs

4. **Availability of up-to-date information**

- 1 users updates, all users can immediately see this update

- essential for many transaction processing applications

- made possible by concurrency control and recovery subsystems of dbms.

5. **Economies of scale**

- by consolidating data and applications , wasteful overlap of resources can be avoided thus, reduces overall costs of operation and management.

C. Disadvantages: when not to use dbms

• **Overhead costs** of using dbms - is the ongoing cost to run the dbms. Reasons:

a. High initial investment

b. Overhead for providing security , concurrency control , recovery

• rather than use dbms, we can use file system when database and application is simple , well-defined and no changes expected. And also when multiple user access is not required

X. HISTORY OF DATABASE APPLICATIONS

- do to change and requirements each day and evolution of internet new types off data base has emerged.

A. Early database applications using hierarchical and network systems

• main problem: lot flexible to develop new queries and reorganizing was difficult

• implemented in the mid-1960s, true 1970s and 1980s on large and expensive mainframe computers.

• based on 3 database models:

1. **Hierarchical database model or system**- where data is organized into a tree-like structure starting from the root

- first database model created by ibm in the 1960s

2. **Network database model** - to solve the coming of hierarchical database model but did not became dominant

3. **Inverted file systems**

B. Providing application flexibility with rational databases (RDBMS)

- proposed by E.F Codd which organizes data into tables which can be linked/related

- high-level query language introduced in relational data model which is alternative to the programming interface used in early database system. It is now easier and quicker to write new queries.

- it provides flexibility to quickly develop new queries and reorganize the database as per the change in requirements.

- early experimental systems (1970s) and commercial RDMS (1980s) are quite slow since they didn't use proper search techniques but with the development of new storage and indexing techniques and better query processing, performance of RDMS improved. Gradually rational databases became the dominant type of database system and now exists on all types of computers

C. Object-oriented applications and the lead for more complex databases

- emergence of object oriented programming languages lead to the development of object-oriented databases which incorporated many useful features like data abstraction , encapsulation , inheritance

- the use of the model was limited because of its complexity

- it's mainly used in specialized apps like engineering design , manufacturing system etc.

D. **Interchanging data on the web for e-commerce**

- WWW (World Wide Web) is a large network of interconnected computers. Here the users can create documents using HTML (Hyper Text Markup) any stores them on web servers and can be linked together through hyperlinks.

- **Electronic/E-commerce (1990s)** emerge as the major web application information on e-commerce web pages dynamically extracted from dbms so there's an interchange of data.

• **XML (eXtended Markup Language)** - primary standard for interchanging data

E. Extending database capabilities for new applications

1. Scientific application - store large amount of data from scientific experiments

2. Storage and retrieval of image (X-ray, MRI)

3. Storage and retrieval of videos

4. Data mining apps - analyzing large amount of data

5. Spatial app stores weather information

6. Time series apps - store daily at regular point in time Ex. Daily sales transaction

- The basic relational model are not suitable for the applications above because:

a. More complex data structures were needed

b. New data types were required

c. New query language

d. Your storage and indexing techniques were needed

- this let the dbms developers to add functionalities to these systems like incorporating concepts from object-oriented databases into the relational system and in the form of modules that are optional.

XI. FUNDAMENTALS OF DATABASE SYSTEM

I. DATA MODELS

• one characteristic of data approach is it provides **data abstraction** - the hiding of complex details are not needed by the database users. To achieve it we have what we called data models

• **DATA MODELS**- collection of concepts used to describe the structure of database. It includes a set of basic operations for specifying the retrievals or updates on the database. Also includes concepts to specify the behavior of a database applications

- Categories:

A. **High level/ Conceptual data model**

- provides concepts that are close to the many users perceive data. Use concepts of:

1. **Entities** - represent real word object or concept

2. **Attributes**- further described an entity

3. **Relationships** - association among two or more entities

B. **Low level/ physical data model**

- describes how data is stored in the computer by representing information like format , and access path

• **access path**- structure for efficient searching of database records

C. **Representational/implementation data model**

-categories:

1. Representational data model or record based data models - represent data using record structures

2. Network data models

3. Hierarchical data models

II. **TERMINOLOGIES**

• **Database schema** - description of a database b(META-DATA). Meta-data about data while schema is just a plan/layout/blueprint of the database. Schema is a subset of metadata

• **Schema Diagram** - displayed schema

Ex. Student

Name | Roll No. | Branch | Address

• **Schema Construct** - each object within the schema

Ex. Student, course, etc.

• **Schema Evaluation** - adding information on schema diagram

• **Database state (instant/snapshot)** - the data in the database at a particular moment. When you define a new database the database is empty because it has no data but when you populated or filmed initial data , that's when we have initial database state.

XII. THREE SCHEMA ARCHITECTURE AND DATA INDEPENDENCE

A. Three schema architecture

- helps achieve the characteristics of database approach

- Goal: to separate the user applications (top level) in the physical database (low level)

- 3 Levels:

1. **Internal level** - as internal schema that describes physical storage structure of the database. Use one category of data model which is low level or physical data models

- describes complete details of data storage and access paths

2. **Conceptual level**- heads conceptual schema which describes structure of database

- hides detail of the physical storage and concentrates on describing entities , data types , relationships , constraints etc.

3. **External level** - the cosmos level describes the part of the database that a user is interested in and hides the rest of the database from the user group.

B. **Data independence**

- capacity to change the schema at one level of a database system without having change of schema at the next higher level, only mapping between two levels is changed

- Types:

1. **Logical data independence** - works between external and conceptual schema

- ability to modify a conceptual schema without changing the external schemas application programs.

2. **Physical data independence** - works between internal and conceptual schema

- ability to modify the internal schema without changing the conceptual schema

- changes may be needed to improve performance

CHAPTER 4: PLANNING AND CONTROL IN AN ENTITY

MANAGERRIAL FUNCTIONS

1. PLANNING - make a proper plan, setting goals in establishing objectives.

2. ORGANIZING - collect and use data for application in a proper format or structure.

3. STAFFING - recruiting the people for a particular position to manage the data.

4. DIRECTING - trained staff on how to collect and manage information.

5. CONTROLLING - over the data, person and the work of organization.

I. PLANNING

- the process of establishing goal as well ac cutting strategies to achieve those goals. It contributes to increased efforts, persistence and serves to focus energies on matters that are deemed to be important to organizational success. From perspective of a business is actually a multi-level process.

THE TRADITIONAL MANAGEMENT HIERARCHY (from top to bottom)

-3 Levels of Management – Each level of management process has different responsibilities and plays different roles in planning process)

A. **Top Managers –** responsible for creating what we known as strategic plans which are long-term, commonly covering the next 2-5 years, and communicate organization's goals as well as the actions needed to achieve those goals. Its starting point is the vision and mission statement. They are important and are designed to shape decision making.

i. **Vision Statement –** serves to convey what it would like to achieve or accomplished. It serves as a guide document and future decision making. Although it can be in any length, its usually a better idea to keep them short to avoid diluting efforts

ii. **Mission Statement -** an actual declaration of the orgs' purpose and reason for existence. It communicates what an org actually does.

- Both statements are short and simple but accurately communicate why each of these orgs exist. They serve as to assist managers and others in evaluating potential courses of action. This help an organization ignore these actions that are not consistent with their established mission. Its like a cause and effect – An org that executes on its established mission is more likely to achieved its established vision.

iii. **Strategic Objective -** is a specific goal that serves to unify the efforts of the organization. Like all goals, there is a specific date that they are to be achieved. Ex. Top managers may decide on strategic objective that entails increase in sales by the end of 2022. This objective will then have a

trickle down effect as managers have at lower level of the org develop separate goals that achieved together to increase the chances of the org accomplishing its strategic objective.

B. MIDDLE MANAGERS - engaging in planning of their own - tactical planning. Typically ranges from 6 months to 2 years in length. By creating tactical planning, middle managers are outlining how the organization intends to use it's resources to achieve its strategic objectives which commonly includes labor, technology, infrastructure, and financial capital. For example, the above strategic objective may include tactical plans such as increasing advertising and promotions to enhance sales channels.

C. FIRST LINE MANAGERS/ SUPERVISORS - have the responsibility of applying those plans to their areas of responsibility - operational planning. It involves creating short term goals pertaining to the production or delivery of products. Commonly ranging from 30 days to 6 months. They are designed to help an organization accomplish goals and established in its tactical plan.

Ex. Increase production in anticipation of increased demand, or even optimizing product distribution to decrease delivery time.

Despite the involvement of a different set of managers, it's important that each stage of the planning process is consistent with each other. The reason that planning begins at the top management and not the bottom is so subsequent goals and objectives can be set with a primary objective in mind. If it start at the bottom, there will be an inconsistencies as each business units pursued its own goals and objectives. Organization do not simply strive to be busy but to utilize their resources in an effective, efficient and focused manner to accomplish their established goals.

IMPORTANT STEPS IN PLANNING PROCESS

1. Establishing objectives

- the first step in planning where plans are prepared with a view to achieve certain goals. Hence, establishing the objectives is an important step in the process of planning because plans should reflect the enterprise's objectives.

Early define as to what is to be achieved by policies, procedures, rules, strategies, cheats and programs. Plan must make sure that every activity undertaken contributes to achievement of objectives.

The objectives fixed must clearly indicate what is to be achieved, where action should take place, who is to perform it, how it's to be undertaken and when it is to be accomplished. That is manager should be able to restate the objectives of the firm in definite and clear terms that will motivate examination and evaluation of performance against targeted performance in the plan. Objective should be measurable

2. Determining planning premises

- this promises includes actual forecast data, policies and plans of the enterprise. Planning involves looking into which necessities the enterprise, how future conditions will affect it's activities. Thus, forecasting is an important step in planning. 2 types of forecast:

a. Prediction of general economic conditions

b. Prediction of marking conditions for a specific product or service dealt with by the enterprises.

Keeping the general economic conditions in mind, a study of industry is made. Then d manager proceeds to make a study of his company's share of the market. Forecasting will reveal those areas where control is lacking. Planning will be reliable when the forecast methods are accurate. Hence, the success of the planning depends of very much a family forecasts.

3. Determining alternative courses

- the planner should study all the alternatives, consider the strong and weak points of them and finally select the most promising ones.

4. Evaluating alternative courses

- alternative courses selected should be evaluated in the light of premises and goals. Evaluation involves the study of performance of various actions. Various factors such as profitability, investment requirements, etc. of such alternative should be weighed against each other. Each alternative should be closely studied to determine its suitability.

Many other factors such as uncertain future trend, problems faced financially, uncertainties renders the evaluation process, complex and difficult. Usually alternative plans are evaluated against factors such as cost, risk, benefits, organizational facilities, etc. Computer-based a mathematical plans and techniques can also be utilized to identify best course of action.

5. the best course Selecting

- after having evaluated the various alternatives, the most suitable alternative is selected. With this, the plant can be considered to have been adopted. It is exactly the point at which decisions are made. Sometimes in the best interests of the enterprise, several alternative courses can be adapted.

6. Formulating derivative plans

- planning is not complete as soon as the best course is selected. The main plant should be supported by a number of derivative plans.

Within the framework of a basic plan, derivative plans are formulated in each functional area. Segregation of master plan into departamental, sectional, an individual plans help to understand the real

nature of future uncertainties. To make the planning process more effective, it should also provide for a feedback mechanism. These plans are meant for the implementation of the main plan.

7. Implementation of plans

- is the final step in planning process. This involves putting the plans into action so as to achieve the business objectives. This requires establishments of policies, procedures, standards, budgets, etc.

BUSINESS SYSTEM PLANNING

- every single process happens in a business need to be turn into a system.

• SYSTEM- series of well documented and explained steps that need to be executed for a process to happen. 4 consideration to build a system:

1. ACTORS - who accomplish the task

2. TOOLS - needed

3. STEPS - in designing, developing, and testing

4. RESULTS - what you want to achieve

Every person is replaceable, if you want to sell the business, you have the system in place and the next owner will just follow your system and get the same result.

You depend on people they can mess up your business and so with systems:

a. The safer the business is

b. Easy to expand and scale off

c. Can find problems and know where resources are being wasted increasing productivity of the business.

INFORMATION SYSTEM PLANNING AND DEVELOPMENT

Enterprise information system is gaining in popularity because it plays a vital role in successful of business process, a company or an org need to know the methodology for information system development, planning and application. High risk involved in implementation.

Align information system and organizational strategies - there are many cases in development of information system that fail, problem is that information system costs a lot of money in its development and implementation.

Key Steps in IS Planning

1. Create information system mission statement - role of information system organization in corporation

2. Articulate vision for information system - the ideal technology (hardware, software, & communications)

✓ how big the information system you want to develop?

✓ if you want an automatic system in business process.

✓ information on how far have you done with your business.

✓ information system as enterprise resource planning.

✓ what information system you want to develop? Ex. Expert System/DSS

3. Create information system plans - and how to achieve it

• Tactical plans - objectives and ways to achieve them

4. Create operation plans - projects, priorities, staffing, purchases, and funding

5. Create budget - how much money needed for information system development

• MISSION STATEMENT - important overarching goal of an organization. It describes goals of information system and should be compatible with organizational vision statement

• CIO develop strategy plan for implementation

- broken down into objectives (tactical plans)

- objectives broken down to operational details

• IT planning similar to planning of other resources

• Growing proportion of IT funds spent on software. Today proportion of IT funds spend more on purchasing software and less on developing in house. The cost of information system development is much more expensive than on buying the software.

THE BENEFITS OF STANDARDIZATION IN PLANNING

- major goal of planning is standardization

1. Cost savings - better bargaining power and applies to hardware and software

2. Efficient training - smaller variety of software

3. Efficient support - more specialization

2 APPROACHES TO SYSTEMS DEVELOPMENT

- after planning decide how to obtain systems - the methodologies on software development

A. SYSTEMS DEVELOPMENT LIFE CYCLE (SDLC)

- traditional or earlier approach in systems development

- known as waterfall development and consists of sequential faces but organizations sometimes takes shortcut.

- FOUR MAJOR PHASES

1. ANALYSIS - 5 Step Process:

a. Investigation - determine if system necessary and small team interview employees

b. Feasibility studies - conducted after information system warranted.

• technical feasibility - determines if components exist and adequate hardware needed to implement software.

Ex. Automotive attendance sheet - needs optical or print scanner which will automatically record to the system.

c. Economic feasibility study - used to calculate:

i. Cost/benefit analysis - spreadsheet showing costs and benefits must overweight costs

ii. Return on investment (ROI) - most accurate economic analysis and calculate difference between stream of benefits and costs.

- many benefits are intangible - for a long term benefits, information system plays a vital role in competitive advantage of an organization.

d. Operational feasibility study - determine house system will be used

• organizational culture: general tone of corporate environment, these are some cases that the organization environment doesn't welcome information system in their daily operational situations. System compatibility with culture

e. Requirements definition - project team installed

• system requirements - functions expected from system

2. DESIGN

- if purchasing system must determine how to adopt - construction requires changing programming code.

- 3 Steps:

a. Description - people uses information system doesn't understand IT codes symbols used to communicate ideas - visual info graphs/ understand more quickly.

Ex. Data Flow Diagram (DFD) - descrbes flow of data. Simplicity of dfd is advantage and it is suitable for describing non computer based information system and can not describe system completely. It is part of UML (Unified Modeling Language) de facto standard for diagramming.

✓ use for modeling business process on system lifecycle

✓ helps developers communicate features

✓ divide standard symbols and notations

- consist of diagrams describing software (use case, class, integration, state, activity, and physical components)

- 4 symbols:

i. External entities ■ - are external individuals and groups. Ex. Customer

ii. Process ● - are events that change data. Ex. Add new customer record

iii. Data Stores - resting data. Ex. Customer database

iv. Data flow - direction that data moves. Ex. New customer record

b. Construction - mostly programming and takes months to years. Testing done on completed modules

• walk-through object of diagram

• simulation of actual program execution

c. System Testing - test and terry system and try to "outsmart system". Poor testing causes many failures

3. IMPLEMENTATION - 2 steps:

a. Training

b. Conversion- switching old systems to new. 4 basic strategies:

i. Parallel conversion - old system used with new system at first.

ii. Phased conversion - break information system into modules and integrate one at a time.

iii. Cut-over conversion - immediately replace all

iv. Pilot conversion - introduced in one business unit at a time

4. SUPPORT - longest phase of system life cycle. 2 responsibilities:

a. User help

b. Maintenance - updates and post implementation debugging

B. NON-TRADITIONAL METHODS

1. PROTOTYPING - fast development of application based on initial requirements.

2. AGILE METHOD - alternative to sdlc and treat software development as a series of contracts with users. Fast development of software and improves software after user specifications received. Iterative programming.

- emphasize continuous improvement based on user request:

identify preliminary requirements of the system ↓

✓ construct a working model ↓

✓ the user try the system → satisfactory deliver the system → if unsatisfactory, identify additional requirements and refining the system

- popular agile methods:

a. Extreme programming (XP)

b. Adaptive software development (ASD)

c. Lean development (LD)

d. Rational unified process (RUP)

e. Feature driven development (FDD)

f. Dynamic system development method (DSDM)

g. Scrum

h. Crystal

- agile method risks:

i. Analysis phase limited/eliminated - risk of incompatibilities.

ii. Less documentation - difficult modification

• manifesto for agile software development prioritizes individual and interactions over processes. Light but sufficient development process.

- when to use argile methods:

a. When system is a small-

b. For unstructured problems

c. Users cannot specify all requirements at start - unfamiliar with technology and difficult to conceptualize.

d. When the development team is small and co-located

e. System requirements are dynamic

f. System will not put people and critical organization goals at risk

g. Development project budget is right

- when not to use agile methods:

a. System is large - system failure entails greater financial loss

b. Design to interface with other systems - SDLC is recommended for complex system and documentation is key

c. When the team is large or distributed in multiple sites

d. System requirements are fairly static

e. System will significantly affect people's well-being and critical organizational goals

f. Development is well funded

SHSTEMS INTEGRATION

- combined disparate systems

✓ examines needs for entire organization

✓ allows data to flow between units

✓ some service companies specialize in this

✓ integration more challenging than development

✓ interface legacy systems with new systems

- systems integrators must be skilled in hardware and software. Difficult to overcome in compatibility issues, systems integration may span several organization and integration with telecommunications.

- situations calling for system integration:

1. Linking existing information system to websites

2. Linking databases to websites

3. Interfacing legacy systems with new systems

4. Linking legacy database with enterprise applications

5. Sharing information systems among organizations

CHAPTER 5: CONTROLLING PROCESS

- it does three tasks:

1. It verifies that all allotted tasks are being performed in time (time factor)

2. It ensures that activities in our organization are performed as per the plan.

3. It ensures that an organization's resources are being used effectively and efficiently for the achievements of predetermined goals.

- controlling should not be misunderstood as the last function of management, it's a function that brings back the management cycle back to the planning function

CHARACTERISTICS OF CONTROLLING

1. It is pervasive function – control is embedded in each level of organizational hierarchy (from top to bottom level, everywhere control function is required).

2. Control is forward looking – it's related to future because past cannot be controlled.

3. Control is continuous activity – as it involves continuous review of standards of performance and results in corrective action (you can't do it once or twice but it has to be done all the time).

4. Control is closely linked with planning – without control all the planning will fail.

5. Control compares actual performance with planned performance.

6. Control minimizes costs and save time.

PROCESS OF CONTROLLING

- it is a circular process, so all the steps will be repeated periodically until the goal is achieved.

1. Setting performance standards – let employees know about what to expect in terms of time, quality, quantity, etc.

2. Measuring performance – where the actual performance or results are determined.

3. Comparing performance – this is when the actual performance is compared to the standard.

4. Taking corrective action – involves making whatever actions are necessary to get things back on track.

CONTROLLING TECHNIQUES

A. TRADITIONAL TECHNIQUE

1. Personal Observation – enables the manager to collect first hand information. It also creates psychological pressure on the employees to perform well as they are aware that they are being observed personally on their job.

- under this technique, managers note the actual performance of employee then decides whose performance is weak and how to improve. However, very time consuming exercise and cannot effectively used in all kinds of jobs.

2. Statistical reports or analysis – in the form of averages, percentages, ratios, correlation, etc. that present useful information to the managers regarding performance of the organization in various areas. Such information when presented in the form of charts, graphs, tables, etc enables managers to read them more easily. It allows a comparison to be made with performance in previous periods and also with the benchmarks.

3. Break even analysis – a technique used by managers to study the relationship between costs, volume and profits. It determines the probable profit and losses at different levels of activity. It is a useful technique for the managers as it helps in estimating profits at different levels of activities.

• break even point – the sales volume at which there is no profit and loss. It is determined by the intersection of total revenue and total cost curves.

✓ beyond this point, the firm will start earning profits

below this point, it will be having losses.

4. Budgetary control – a technique of managerial control in which all operations are plan in advance in the form of budgets. The actual results are then compared with budgetary standards and this comparison will tell what necessary action is required.

- different types of budgets are:

a. Sales budget

b. Production budget

c. Cash budget

d. Research and development budget

B. MODERN TECHNIQUES

1. Return on investment (ROI) – measures whether or not the invested capital has been used effectively for generating reasonable amount of return. Be calculated as:

ROI = Net Income / Total Investment

Where: net income, before and after tax may be taken for comparison

Total investment include both working and fixed capital invested in the business.

- " Everytime we make an investment decision at fedex, we ask ourselves: what is the return on investment?" – Frederick Smith.

2. Ratio analysis – refers to analysis of financial statement trough computation of ratios

a. Liquidity ratios – determine the current position of liquid funds of the business or the short term solvency.

✓ current ratio

✓ quick ratio

b. Solvency ratios – determine the long-term solvency of business.

✓ debt-equity ratio

✓ proprietary ratio

✓ interest coverage ratio

c. Profitability ratios – determine the profitability position of the business.

✓ gross profit ratio

✓ net profit ratio

✓ return on capital employed

d. Turnover ratios – determine the effective utilization of resources. Higher turnover means better utilization of resources.

✓ inventory turnover ratio

✓ stock turnover ratio

✓ debtors turnover ratio

3. Responsibility accounting – system of accounting in which different departments of an organization or setup of "responsibility centres". The head of the centre is responsible for achieving target set for his centre. Types of responsibility centres:

a. Cost centre – manager are held responsible for the cost incurred in an organization. Ex. Painting Department in an automobile plant – involves the cost factor.

b. Revenue centre – responsible for generating revenues. Ex. Advertising sales department of a mobile application developer – that particular department we expect revenue to be generated.

c. Profit centre – manager is responsible for both revenue and cost incurred. Ex. Company-owned current in a fast food chain

d. Investment centre – responsible not only for profits but also for investments. Ex. Small startup company.

4. Management audit – helpful in identifying the deficiencies in the performance of management functions. Conducting management audit may sometimes post a problem as there are no standard techniques of management audit. These are mostly conducted by chartered accountants and can be done internally or through an auditing firm.

- also management audit is not compulsory under the law. Characteristics:

a. Independent and fair

b. Evidence-based

c. Transparent and accountable

d. Decentralized and delegated

e. Participative and collaborative

f. Continuous and objective improvement

g. Professionally competent

h. Legitimate

5. Management information systems (MIS) – a computer based information system that provides information and support for effective managerial decision making. It provides data and information to the managers at the right time so that appropriate corrective action may be taken in case of deviations from standard.

6. PERT (Programme Evaluation & Review Technique) and CPM (Critical Path Method) – our network techniques useful in implementing the time bound projects involving performance of a variety of complex, diverse, and interrelated activities. These nyx deal with time scheduling and resource allocation for these activities. It aims at effective execution of projects within given time schedule and structure of costs.

- situations in network diagram:

a. A must finish before B or C can start

b. Both A & B must finish before C can start

c. Both A & B must finish before either C or D can start

d. A must finish before B can start. Both A & C must finish before D can start

CHAPTER 6: MEANS-ENDS ANALYSIS (MEA)

- in artificial intelligence, we have study many search strategies which traverse either in forward or backward direction, but a mixture of these two is used to be appropriate to solve a complex and large problem.

- such a mixed search algorithm, allow us to solve the major parts of a problem first and then go back and solve the small problems which arise while combining the major parts of the problem.

- The MEA analysis process centered on finding the difference between the current state and goal state and applying the operators to reduce this difference.

HOW MEANS-ANALYSIS ALGORITHM WORKS

- a given problem, we need to apply the mea algorithm recursively.

- following are the major steps which describes the working principle of mea search technique to solve the problem.

1. Find the difference between initial/start state and goal state.

2. From the available sets of operators, select an operator which can be applied current state to reduce the difference between current and goal state.

3. Apply the selected operator

• Operator Subgoaling – but sometimes it is possible that an operator cannot be applied to the current state. Hence we divide the current states into subproblems, and then we apply an operator on sub problems.

MEANS-ENDS ANALYSIS ALGORITHM

Let's assume current state as "current" and goal state as "goal". Steps:

1. Compare current to goal, if there are no difference between both then return success and exit.

2. Else, select the most significant difference between current and goal and reduce it by doing the following steps until the success or failure occurs.

a. Select a new operator O which is applicable for the currenct difference, is there is no such operator than signal failure.

b. Attempt to apply operator O to current. Make a description of two states.

i. O-Start, a state in which O's pre-conditions are satisfied.

ii. O-Result, the state would result if O were applied in O-Start

c. If

(First-Part – MEA (CURRENT, O-START)

(Last-Part – MEA (O-RESULT, GOAL), successful in signal success in return the result of combining FIRST-PART, O, and LAST-PART

EXAMPLE:

1. Evaluating the initial step – and compare the initial state and goal state to find the differences between both states.

2. Applying delete operator – as we can check the first difference is that involve state there is no that symbol which is present in initial states so first we apply the delete operator to remove this dot.

3. Applying the move operator – the new state occurs which we will again compared with goal state. After comparing these states, there is another differences that is the square is outside the circle so we will apply the move operator.

4. Applying expands operator – now a new state is generated in the third step and we will compare this state with the goal state. After comparing these states there is still one difference which is the size of the square, factor in finally it will generate the goal state.

1. PLANNING PROCESS

Important Steps in Planning Process

Planning involves a number of steps ranging from determining the objectives to follow-up action as detailed below. The main steps that are taken in planning process are as follows:

1. 1 Establishing Objectives

Establishing the objectives is the first step in planning. Plans are prepared with a view to achieve certain goals. Hence, establishing the objectives is an important step in the process of planning. Plans should reflect the enterprise's objectives. Objectives should clearly define as to what is to be achieved by policies, procedures, rules, strategies, budgets and programmes. Plan must make sure that every activity undertaken contributes to the achievement of objectives.

The objectives fixed must clearly indicate what is to be achieved, where action should take place, who is to perform it, how it is to be undertaken and when it is to be accomplished. That is, managers should be able to restate the objectives of the firm in definite and clear terms that will motivate examination and evaluation of performance against targeted performance in the plan. Objectives should be measurable.

1.2 Determining Planning Premises

This is the second step in planning. Premises include actual forecast data, policies and plans of the enterprise. Planning involves looking into the future which nessitates the enterprise to know, how the future conditions will affect its activities. Thus, forecasting is an important step in planning. There are two types of forecasting namely,

1. Prediction of general economic conditions.

2. Prediction of market conditions for a specific product or service dealt with by the enterprise.

Keeping the general economic conditions in mid, a study of the industry is made. Then the manager proceeds to make a study of his company's share of the market. Forecasting will reveal those areas where control is lacking. Planning will be reliable when the forecast methods are accurate. Hence, the success of the planning depends very much upon the forecasts.

1.3 Determining Alternative Courses

Determining alternative courses is the third step in the planning process. The planner should study all the alternatives, consider the strong and weak points of them and finally select the most promising ones.

1.4 Evaluating Alternative Courses

Alternative courses so selected should be evaluated in the light of premises and goals. Evaluation involves the study of performance of various actions. Various factors such as profitability, investment requirements, etc., of such alternatives should be weighed against each other. Each alternatives should be closely studied to determine its suitability.

Many other factors such are uncertain future trend, problems faced financially, future uncertainties renders the evaluation process, complex and difficult. Usually, alternative plans are evaluated against factors such as cost, risks, benefits, organizational facilities, etc. Computer based mathematical plans and techniques can also be utilized to identify best course of action.

1.5 Selecting the Best Course

After having evaluated the various alternatives, the most suitable alternative is selected. With this, the plan can be considered to have been adopted. It is exactly the point at which decisions are made. Sometimes, in the best interests of the enterprise, several alternative courses can be adopted.

1.6 Formulating Derivative Plans

Planning is not complete as soon as the best course is selected. The main plan should be supported by a number of derivative plans. Within the framework of a basic plan, derivative plans are formulated in each functional area. Segregation of master plan into departmental, sectional, and individual plans, helps to understand the real nature of future uncertainties. To make the planning process

more effective, it should also provide for a feedback mechanism. These plans are meant for the implementation of the main plan.

1.7 Implementation of Plans

Implementation of plans is the final step in the process of planning. This involves putting the plans into action so as to achieve the business objectives. Implementation of plans requires establishment of policies, procedures, standards, budgets, etc.

2.CONTROL PROCESS

- Controlling is an important function of management.
- It verifies that all the allotted tasks are being performed on time.
- Controlling ensures that activities in an organization are performed as per the plans.
- Controlling also ensures that an organization's resources are being used effectively and efficiently for the achievement of predetermined goals.
- Controlling should not misunderstood as the last function of management.
- It is a function that brings back the management cycle back to the planning function.

Characteristics of Controlling

1. It is pervasive I.e., control is embedded in each level of organizational hierarchy.

2. Control is forward looking. It is related to future as past cannot be controlled.

3. Control is continuous review of standards of performance and results in corrective action.

4. Control is closely linked with planning.

5. Control compares actual performance with planned performance.

6. Control minimizes cost and saves time.

Process of Controlling

1. **Setting performance standards** - let employees know what to expect in terms of time, quality, quantity, and so forth.

2. **Measuring performance** - where the actual performance or results are determined.

3. **Comparing performance** - this is when the actual performance is compared to the standard.

4. **Taking corrective action** - involves making whatever actions are necessary to get things back on track.

The controlling functions should be circular in motion, so all the steps will be repeated periodically until the goal is achieved.

Controlling Techniques

Traditional Techniques

1. Personal Observation

- Personal observation enables the manager to collect first hand information.
- It also creates a psychological pressure on the employees to perform well as they are aware that they are being observed personally on their job.
- Under this technique, manager notes the actual performance is weak and how to improve it.
- However, it is a very time-consuming exercise and cannot effectively be used in all kinds of jobs.

2. Statistical Reports

- Statistical analysis in the form of averages, percentages, ratios, correlation, etc., present useful information to the managers regarding performance of the organization in various areas.
- Such information when presented in the form of charts, graphs, tables, etc., enables the managers to read them more easily.
- It allows a comparison to be made with performance in previous periods and also with the benchmarks.

3. Break Even Analysis

- Break even analysis is a technique used by managers to study the relationship between costs, volume and profits.
- It determines the probable profit and losses at different levels of activity.
- The sales volume at which there is no profit, no loss is known as break even point.
- Break even point is determined by the intersection of total revenue and total cost curves.
- It is beyond this point that the firm will start earning profits.
- It is a useful technique for the managers as it helps in estimating profits at different levels of activities.

4. Budgetary Control

- It is a technique of managerial control in which all operations are planned in advance in the form of budgets.
- The actual results are then compared with budgetary standards.
- This comparison tells us what necessary action is required.
- Different types of budget are:

1. Sales Budget

2. Production Budget

3. Cash Budget

4. Research and Development Budget

Modern Techniques

1. Return on Investment

- RoI measures whether or not the invested capital has been used effectively for generating reasonable amount of return.
- It can be calculated as follows:

RoI = Net Income/total Investments

Where Net Income, before and after tax may be taken for comparison;

And total Investments include both working and fixed capital invested in the business.

2. Ratio Analysis

- Ratio analysis refers to analysis of financial statements through computation of ratios.
- Some of the ratios used in the organization are:

1. **Liquidity Ratios** - determine the current position of liquid funds of the business or the short term solvency.

2. **Solvency Ratios** - determine the long term solvency of business

3. **Profitability Ratios** - determine the profitability position of the business

4. **Turnover Ratios** - determine the effective utilization of resources. The higher the turnover, the better utilization of resources.

3. Responsibility Accounting

- It is a system of accounting in which different departments of an organization are set up as a “Responsibility Centers”.
- The head of the center is responsible for achieving the target set for his center.
- Responsibility centers may be of the following types:

1. **Cost Center** - managers are held responsible for the cost incurred in the organization.

Ex. Painting Department in an automobile plant

2. **Revenue Center** - this center is responsible for generating revenue.

Ex. Advertising Sales Department of a mobile app developer

3. **Profit Center** - manager is responsible for both revenue and cost incurred

Ex. Company-owned restaurant in a fast-food chain

4. **Investment Center** - center is responsible not only for profits but also for investments.

Ex. Small start-up company

4. Management Audit

- It is helpful in identifying the deficiencies in the performance of management functions.
- Conducting management audit may sometimes pose a problem as there are no standard techniques of management audit.
- Also, management audit is not compulsory under any law.

Standardized Management Audit

- Independent and fair
- Evidence-based
- Transparent and Accountable
- Decentralized and delegated
- Participative and Collaborative
- Continuous and Objective Improvements
- Professionally Competent
- Legitimate

5. PERT & CPM

- PERT (Programme Evaluation and Review Technique) and CPM (Critical Path Method are important network techniques.
- They are useful in implementing time bound projects involving performance of a variety of complex, diverse and interrelated activities.
- These techniques deal with time scheduling and resource allocation for these activities.
- It aims of effective execution of projects within given time schedule and structure of costs.

6. Management Information System

- Management Information System (MIS) is a computer-based information system that provides information and support for effective managerial decision-making.
- It provides data and information to the managers at the right time so that appropriate corrective action may be taken in case of deviations from standards.

3. INFORMATION SYSTEM PLANNING

- Enterprise ISs gaining in popularity
- High risk involved in implementation
- Successful integration of system vital
- Planning of IS necessary
- Align IS and organizational strategies

Steps in Planning Information Systems

1. Create IS mission Statement
2. Articulate vision for IS
3. Create IS plans
4. Create operations plan
5. Create budget

- Mission Statement: most important overarching goal of organization
- IS mission statement describes goal of IS-should be compatible with organizational mission statement.
- CIO develops strategic plan for implementation
- Goals broken down into objectives
- Objectives broken down to operational details
- IT planning similar to planning of other resources
- Growing proportion of IT funds spent on software
  - more purchasing
  - less developing in-house

T**he Benefits of Standardization in Planning**

- Major goal of planning is standardization

1. Cost savings

- better bargaining power
- applies to hardware and software

2. Efficient training

- smaller variety of software

3. Efficient support

- more specialization

- After planning decide how to obtain systems

- usually software

- Approaches to systems development universal

2 Approaches

1. Systems Development life Cycle (SDLC)

2. Nontraditional methods

- Agile methods more efficient
- **Prototyping**: fast development of application based on initial requirements

The Systems Development Life Cycle (SDLC)

- Large ISs conceived with Systems Development Life Cycle (SDLC)
- SDLC also known as waterfall development

- consists of sequential phases

- Organizations sometimes take shortcuts
- 4 Major Phases

1. Analysis
2. Design
3. Implementation
4. Support

Analysis

- **Systems Analysis:** 5 Step Process

1. Investigation
2. Technical Feasibility Study
3. Economic Feasibility Study
4. Operational Feasibility Study
5. Requirements Definition

- 1st step is Investigation

- determine if system necessary

- small team interviews employees

- **Feasibility Studies**: conducted after IS warranted

Technical feasibility

- determine if components exist

- adequate hardware

- Economic feasibility study

- **Cost/Benefit Analysis:** spreadsheet showing costs

- **Return on Investment (ROI):** most accurate economic analysis

- difference between stream of benefits and costs

- Many benefits are intangible
- Operational Feasibility Study

- determine how new system will be used

- **Organizational culture:** general tone of corporate environment

- System compatibility with culture

- Requirements definition

- project team installed

-**System requirements:** function expected from system

Design

- 2nd step in systems development is design
- **System Design:** 3 Steps

- Description

- Construction

- Testing

- If purchasing system must determine how to adapt

-construction requires changing programming code

- Symbols used to communicate ideas

- visual information grasped more quickly

- **Data Flow Diagram (DFD):** describes flow of data

- 4 Symbols

1. External entities
2. Processes
3. Data stores
4. Direction of data flow

- DFD Symbols

  - External entities are external individuals and groups

  - Processes are events that change data

  - Data store is resting data

  - Data flow is direction that data moves

- Simplicity of DFD is advantage
- DFD suitable for describing non-computer based IS
- DFD cannot describe system completely
- **Unified Modeling Language (UML):** de facto standard for diagramming

  - helps developers communicate features

  - provides standard symbols and notations

  - consists of diagrams describing software

  1. Use case
  2. Class
  3. Interaction
  4. State
  5. Activity
  6. Physical components

- Construction

  - mostly programming

  - takes months to years

  - testing done on completed modules

    -walk-through logic of program

    -simulation of actual program execution

- System testing

  - test entire integrated system

  - try to “outsmart” system

  - poor testing causes many failures

Implementation

2 Steps

1. Conversion
2. Training

- **Conversion:** switching old system to new

  - 4 basic Strategies

  1. **Parallel Conversion:** old system used with new system at first
  2. **Phased conversion:** break IS into modules and integrate one at a time
  3. **Cut-over Conversion:** immediately replace all
  4. **Pilot conversion:** introduce in one business unit at a time

Support

2 Responsibilities

1. Maintenance

   -post-implementation debugging

   -updates

   -adding postponed features

2. User help

-longest phase of system life cycle

Agile Methods: alternatives to SDLC

- treat software development as series of contacts with users

- fast development of software

- improve software after user specifications received

- iterative programming

- Popular Agile Methods

  - Extreme Programming (XP)

  - Adaptive Software Development (ASD)

  - Lean Development (LD)

  - Rational Unified Process (RUP)

  - Feature Driven Development (FDD)

  - Dynamic Systems Development Method (DSDM)

  - Scrum

  - Crystal

- Agile method risks

  - Analysis phase limited or eliminated

    -risk of incompatibilities

  - Less documentation

    -difficult modification

- Manifesto for Agile Software development prioritizes individuals and interactions over processes
- Light but sufficient development process
- User involvement encouraged throughout process
- Test modules immediately after completion
- Communication with users informal
- Two programmers per module

When to Use Agile Methods

- Best to use Agile Method

  - When system is small

    -analysis less important

    -small investment of resources

  - For unstructured problems
  - Users cannot specify all requirements at start

    -unfamiliar with technology

    -difficult to conceptualize

When Not to Use Agile Methods

- Do not use Agile Method when

  - System is large

    -system failure entails great financial loss

  - Designed to interface with other systems

    -SDLC recommended for complex systems

    -Documentation is key

When to use agile methods	When not to use agile methods
Small-scale system	Large-scale system
System solving unstructured problems	Complex system
When it's difficult for users to specify system requirements	System with interfaces to other systems
When the development team is small and co-located	When the team is large or distributed in multiple sites
System requirements are dynamic	System requirements are fairly static
System will not put people and critical organization goals at risk	System will significantly affect people's well-being and critical organizational goals
Development project budget is tight	Development is well-funded

Systems Integration: combine disparate systems

- Examines needs of entire organization
- Allows data to flow between units
- Some service companies specialize in this
- Integration more challenging than development
- Interface legacy systems with new systems

Situations calling for systems integration:

Linking existing ISs to websites

Linking databases to websites

Interfacing legacy systems with new systems

Linking legacy databases with enterprise applications

Sharing information systems among organizations

- Systems integrators must be skilled in hardware and software
- Difficult to overcome incompatibility issues
- Systems integration may span several organizations
- Integration with telecommunications

5.END MEANS ANALYSIS

- In Artificial Intelligence, we have studied many search strategies which traverse either in forward or backward direction, but a mixture of these two is

usually appropriate to solve a complex and large problem.

- Such a mixed search algorithm, allow us to solve the major part of a problem first and then go back and solve the small problems which arise while combining the major parts of the problem.
- Such a technique is called **Means-End Analysis (MEA)**
- The MEA Analysis process centered on finding the difference between the current state and goal state and applying the operators to reduce this difference.

How Means-Ends Analysis Algorithm Works

- To solve a given problem, we need to apply the MEA Algorithm recursively.
- Following are the major steps which describes the working principle of MEA search technique to solve the problem.

1. First, find the difference between Initial (start) and Goal State.
2. From the available set of operators, select an operator which can be applied to current sate to reduce the difference between current state and goal state.
3. Apply the selected operator.

Means-Ends Analysis - Operator Subgoaling

- In the MEA process, first, we find the differences between the current sate and goal state.
- Once we find the differences, then we apply an operator to reduce the differences.
- But sometimes it is possible that an operator cannot be applied to the current state.
- Hence we divide the current sate into sub problems, and then we apply an operator on sub problems, such type of analysis is called as **Operator Subgoaling.**

Means-Ends Analysis Algorithm

Let's assume Current state as CURRENT and Goal State as GOAL, then the following are the steps of MEA Algorithm.

- **Step 1:** Compare CURRENT to GOAL, if there are no differences between both then return Success and Exit.
- **Step 2:** Else, select the most significant difference between CURRENT and GOAL and reduce it by doing the following steps until the success or failure occurs.

a) Select a new operator **O** which is applicable for the current difference, if there is no such operator, then signal failure.

b) Attempt to apply operator **O** to CURRENT. Make a description of two sates.

i. O-Start, a state in which O?s preconditions are satisfied.

ii. O-Result, the state that would result if O were applied in O-start

c) If

(First-Part <---- MEA (CURRENT, O-START) and

(Last-Part <---- MEA (O-Result, GOAL), are successful, then signal Success and return the result of combining FIRST_PART, O, and LAST-PART.

BUILDING A SYSTEM

SYSTEM – a series of very well-documented and explained steps thats need to be executed for that process to happen.

4 things to consider in making a system

1. Actor
2. Tools
3. Steps
4. Results

Why do we need system in out business? – Every single person in the business is replaceable. You don't have to depends on them because you have your system.

The more system you have, the more well-documented your system are, it easier to replace you or anyone in your business.

Planning in an Organizational Setting

One of my favorite quotes related to planning comes from American inventor and businessmen Thomas Edison. He said being busy does not always mean real work. The object of all work is production or accomplishment and to either of these ends there must be forethought, system, planning, intelligence, and honest purpose, as well as perspiration. Seeming to do is not doing. Edison's words stress the significant role that planning has not only for individuals,

but also for organizations.

Planning

- can be described as the process of establishing goals as well as outlining strategies to achieve those goals.
- Experts have found that planning contributes to increased effort, persistence, and even serves to focus energies on matters that are deemed to be important to organizational success.
- But with so many moving parts to businesses today, how do they engage in effective planning at all levels of the organization?
- Planning from the perspective of a business is actually a multi-level process.

three levels of management by traditional management hierarchy

- top managers
- middle managers,
- and first-line managers.

Each level of management possess different responsibilities and also plays a different role in the planning process.

Top managers are responsible for creating what are known as strategic plans.

These **strategic plans** are long-term, commonly covering the next two to five years, and communicate the organization's goals as well the actions needed to achieve those goals.

Starting point to any strategic plan is the **vision and mission statement**.

These two statements are very important, and are designed to shape decision-making in the organization.

Vision statement serves to convey what it would like to achieve or

accomplish and serves as a guide to current and future decision-making.

Although vision statements can be any length, it's usually a better idea to keep them short to avoid diluting efforts.

Amazon's vision statement is to be the earth's most customer centric company; to build a place where people can come to find and discover anything they want to buy online.

Despite only a few sentences, Amazon's vision statement clearly communicates what

it wants to achieve and thus serves as an excellent guide to decision-making.

After a vision statement is crafted, top managers then **create a mission statement for the organization**.

Mission statement is an actual declaration of the organization's purpose or reason for existence. While the vision statement communicates what an organization wishes to accomplish, the mission statement communicates what an organization actually does.

For example, **Google's mission** is to organize the world's information and make it universally accessible and useful.

That **mission of Starbucks** is to inspire and nurture the human spirit—one person, one cup and one neighborhood at a time.

Both of these statements are short and simple, but accurately communicate why each of these organization's exists.

Like a vision statement, an organization's mission statement serves to assist top managers and others in evaluating potential courses of action. This helps an organization ignore those actions that are not consistent with their established

mission. If you're having a difficult time grasping the difference between the two statements, one way to look at them is like cause and effect. An organization that executes on its established mission is more likely to achieve its established

vision.

Now that a **vision and mission statement have been established**, top managers are responsible for setting strategic objectives.

strategic objective

- is a specific goal that serves to unify the efforts of the organization. Like all goals,
- are time-bound meaning there is a specific date that they are to do be achieved.

For example, top managers may decide on a strategic objective that entails establishing twenty-five percent market share in a certain market by the end of 2016. This objective will then have a trickle down effect as managers at lower level of the organization develop separate goals that, achieved together, will increase the chances of the organization accomplishing its strategic objective.

Now that top managers have engaged in strategic planning, its the responsibility of middle managers to engaging in planning of their own.This planning is referred to as tactical planning.

Tactical Planning - typically ranges from six months to two years in length.

By creating tactical plans, middle managers are outlining how the organization intends to use its resources to achieve its strategic objectives. These resources commonly include labor, technology, infrastructure, and financial capital.

Looking back to our original strategic objective, we may develop a tactical plan that includes increasing advertising expenditures in under-represented markets and developing partnerships with key retailers as actions to accomplish our objectives.

After tactical plans have been developed, first-line supervisors have the responsibility of applying those plans to their areas of responsibility. This type of planning is referred to as operational planning.

Operational planning - involves creating short-term goals pertaining to the production or delivery of products. Commonly ranging from thirty days to six months,

operational plans are designed to help an organization accomplish goals established in its tactical plan.

A possible operational plan could be to increase production in anticipation of increased demand,or even optimizing product distribution to decrease delivery time.

Despite the involvement of a different set of managers, it's important that each stage of the planning process is consistent with the other. In fact, the reason that planning begins at the top of the organization and not the bottom, is so subsequent goals and objectives can be set with a primary objective in mind.

If planning started at the bottom, imagine the inconsistencies that would develop as each business unit pursued its own goals and objectives. Organizations do not simply strive to be busy, but strive to utilize their resources in an effective, efficient, and focused manner to accomplish their established goals.